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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
A23J 3/22, 3/26, 3/18, A23P 1/12

A1

(11) International Publication Number: WO 94/28738

(43) International Publication Date: 22 December 1994 (22.12.94)

(21) International Application Number: PCT/GB94/01293

(22) International Filing Date: 15 June 1994 (15.06.94)

(30) Priority Data:
9312346.1 16 June 1993 (16.06.93) GB

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(81) Designated States: AU, CN, GB, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A COOKED MINCED MEAT LIKE PRODUCT AND A METHOD FOR THE PRODUCTION THEREOF

(57) Abstract

A cooked minced meat like product and a method for the production thereof comprises the following features and steps. The product comprises gluten, hydrated textured vegetable protein, water, dried egg albumen and sundry spices flavour and colour blended to produce a dough which is extruded through a plate preferably having 5 mm holes into vegetable oil preferably at 190 °C to set it and then cut to size. Alternatively, the dough may be cut or otherwise shaped before being heat set. This results in a tasty edible product with an acceptable bite.

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A COOKED MINCED MEAT LIKE PRODUCT AND A METHOD FOR THE PRODUCTION THEREOF

The present invention relates to a cooked minced meat like product for use as a substitute or an extender.

According to one aspect of the present invention, there is provided a process for the production of a minced meat like product comprising the steps of blending together one or more vegetable proteins, one of which is wheat gluten and water to produce a mixture, extruding the mixture through an aperture having a diameter in the range 2.0mm to 100mm, and setting the resultant extrudate by heating to a temperature of at least 65°C.

According to another aspect of the present invention, there is provided a product made by the above method comprising a minimum protein content of 49%, on a moisture and oil free basis, a minimum oil content of 5%, and a final moisture content between 15% and 80%.

A preferred embodiment of the product consists of a blend of gluten, textured vegetable protein, and water which results in a dough which is shaped and heat set without the use of additives being necessary.

Some properties of baking doughs ar taken and adapted for a savoury application. A normal baking dough is typically bas d on wh at and

water.

Wheat flour consists of 12-14% protein of which when hydrated 85% becomes gluten. The bulk of the rest of the flour is made up of carbohydrates in the form of starch granules (65-70%) and a small amount of sugar.

In accordance with a preferred feature of the invention, the carbohydrate fraction in the form of starch granules is substituted with a functional ingredient namely a vegetable protein.

The main events when a bread dough is produced are as follows. Firstly, an initial hydration of the damaged starch granules is effected. Secondly, the protein fraction hydrates to form discrete wedges, which by the end of the process have formed a 3-dimensional structure, which is primarily glutenin, in which swollen starch granules, and undamaged granules are embedded. In a yeast fermented dough, the carbon dioxide produced causes the gluten molecules to be stretched into linear chains which interact to form elastic sheets under the gas bubbles.

In a preferred embodiment of this invention, because a vegetable protein has been introduced in place of the starch granules, and because there is no carbon dioxide formation, the 3-dimensional formation is interrupted with hydrated textured vegetable protein.

In a bread dough the major proteins come from the gluten fraction of the flour. These are classified according to their solubility in a solvent and are known as glutenin and gliadin. The glutenins form the 3-dimensional structure and this is modified by the gliadins. Glutenins are associated with gluten elasticity and the gliadins with viscosity.

A further consideration is the interaction between any non-gluten proteins and gluten proteins. This type of interaction leads to compact highly resistant non-extensible units. In bread doughs these are regarded as undesirable. A good strong bread dough is regarded as being less viscous than elastic with not too much non-gluten protein, gluten protein interaction. However, in a preferred embodiment of this invention the starch granules are replaced by textured vegetable protein, thus these gluten protein, no-gluten protein interactions are positively encouraged. Therefore, the dough that is formed, in accordance with the invention, is more viscous than elastic.

The types of interaction are varied and complex due to the nature of the proteins present. They may be broadly described as covering the whole range of the possible interactions e.g. ionic, covalent, hydrogen bonding and Van der Waals forces.

In accordance with the invention the desir d she t structure that is f rm d when th mixture is work d for the d sired amount of time is thought to be dominated by the glutenin.

In order to achieve the structure in the dough a number of mixing methods were investigated. Conventional ribbon and paddle mixers gave an adequate dough. Slightly less efficient was a conventional spiral dough mixer. Machines manufactured by Tweedy and Mono for "no-time" doughs form a very satisfactory dough structure.

The mixing and combining stages were also mimicked very well on a twin screw extruder.

An important element here is the energy input. A bread dough will normally require approximately ll watt h/Kg. The preferred embodiment is for between 5 and 22 watt h/Kg to be imparted during the blending stage dependent upon mix size. The final temperature of the mix would be less than 75°C. Whereas with a baking dough overworking can result in reduced loaf volume, with the present invention the limiting factor is the ability to handle the dough during processing. Overworking is not as critical as regards the quality of the final product.

In line with the current climate of additive free foods, an important feature of the invention is that no additives are required to achieve the desir d end product. Thus the final products are very suitable for application where meat and additiv fre food is a prime consideration.

The resulting dough is then shaped before a heating stage. This is preferably achieved by extruding through an aperture of between 2.0 and 100mm advantageously 2.5 to 15mm preferably 5mm.

The heat setting of the dough is preferably done by allowing the extrudate to be immersed in heated vegetable oil. Other forms of heating were investigated and infra-red travelling oven was also found satisfactory.

The resulting heat set extudate may be further cut to size.

It has been found that the final texture and eating quality of the produce may be modified by addition of egg albumen or a protein isolate. These can contribute to the protein structure within the dough modifying the texture. There is also a marked effect on the quality of the heat set. There is also room for manoeuvre with regard to the use of textured vegetable protein. A number of different untextured vegetable proteins have been investigated which can greatly affect the quality of the dough and the final product (see example 2).

The following examples have been produced in accordance with the invention.

Example I

Gluten (5.0Kg), hydrated textured vegetable protein (15Kg) were added to a Tweedy 70 mixer along with water (6.5l), dried egg albumen (1.0Kg) and sundry spices, flavour and colour. The resulting mix was blended until 10.5 watt h/Kg has been recorded. The resulting dough was extruded through a plate having 5mm holes into vegetable oil at between 100 and 250°C preferably 190° C for 5 seconds. The product was then reduced in size by cutting. The product comprises a minimum protein content of 49% on a moisture and oil free basis, a minimum oil content of 5% and a final moisture content between 15% and 80%.

Example 2

Soya grits (7.0Kg), gluten (4.5Kg), water (16l) were blended in a Hobart dough mixer along with fully hydrated soya protein isolate (4.0Kg) and a preblend of colour, spices and flavour for 35 minutes on high speed. The resulting dough was extruded and heated as per example 1.

Example 3

A twin screw extruder with nominal barrel diameter of 100mm and with a double length barrel of 21 diameters (2.1m) and a primary and auxiliary feed port was set up with a ratio of feed inputs of 1.5 to 1 with respect to port 1 and port 2. Port 1 feed consisted of a mixture of gluten 5 parts, dried egg albumen 0.8 parts, spices and flavours 1.2 parts and vegetable oil 1 part. Port 2 feed consisted of hydrated textured vegetable protein. The barrel profile was set up with sufficient mixing and shear sections to obtain an

homogenous mixture and impart the necessary en rgy. The barrel was set up with a temperature gradient of 30 degrees C to 63 degrees C in the final l.0m. The resulting mass was extruded through a series of 4 holes of 4mm in diameter with a rotating blade giving final lengths of 5 to 9mm and deposited onto a travelling oven of lm in length to yield a final product temperature on exit of llO degrees C.

Example 4.

Soya concentrate (5Kg) was hydrated in a high speed mixer for 5 minutes with 2.5 parts water. To this was added gluten (3Kg), textured vegetable protein (0.5Kg), flavours and spices (0.5Kg), water (2l) and the result mixed at high speed in a Mono mixer for 4.5 minutes on maximum speed. The resulting dough was extruded through a mincing plate of 5.2mm and immersed in hot vegetable oil for l2 seconds.

Although cutting has been referred to the dough may be formed in other ways.

It will be appreciated that the above embodiment has been described by way of example only and that many variations are possible without departing from the scope of the invention.

CLAIMS

I. A process for the production of a minced meat like product comprising the steps of blending together one or more vegetable proteins, one of which is wheat gluten and water to produce a mixture, extruding the mixture through an aperture having a diameter in the range 2.0mm to 100mm, setting the resultant extrudate by heating to a temperature of at least 65°C.

2. A process according to claim I, in which the diameter of the aperture is in the range 2.0 to 19mm.

3. A process according to claim I, in which the diameter of the aperture is in the range 2.5 to 15mm.

4. A process according to claim I, in which the diameter of the aperture is 5mm.

5. A process according to any preceding claim, in which the extrudate is heated for 3 to 150 seconds.

6. A process according to any preceding claim, in which the extrudate is formed to size before or after h ating.

7. A proc ss according to any preceding claim, in which the extrudate is

cut to size to a final length of product in the range 5 to 15mm.

8. A process according to any preceding claim, in which the extrudate is heated by using vegetable oil at a temperature in the range 100°C - 250°C.

9. A process according to any preceding claim, in which the mixing stage imparts between 5 and 22 watt hours/Kg or 4×10^4 to 1.8×10^5 J/Kg, and the final temperature of the mix is less than 75°C.

10. A product made by the method claimed in claim 1 comprising a minimum protein content of 49%, on a moisture and oil free basis, a minimum oil content of 5%, and a final moisture content between 15% and 80%.

11. A product according to claim 10 comprising an addition of egg albumen or vegetable protein isolate.

12. A product according to claim 10 and 11 including colours, flavours, spices are added.

13. A product according to claims 10, 11 or 12, in which the vegetable protein is textured by extrusion cooking or spinning.

14. A product according to claim 10, 11 or 12, in which the vegetable protein is untextured.

15. A product according to any of Examples I to 4.

INTERNATIONAL SEARCH REPORT

nal Application No
PCT/GB 94/01293

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A23J3/22 A23J3/26 A23J3/18 A23P1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 A23J A23P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 043 (C-0681) 26 January 1990 & JP,A,01 277 469 (FUJI OIL CO LTD) 7 November 1989 see abstract ---	1-3,5,8, 10,11, 13-15
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 October 1994	26. 10 94

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	GB,A,2 066 644 (RHONE-POULENC INDUSTRIES) 15 July 1981	1-3, 11-13,15
A	see page 5, line 37 - page 6, line 12; claims 2-5,14,16,21; figures 2,5; example 1	5-7,9
A	EP,A,0 003 912 (M. SHEMER) 5 September 1979 see page 2, paragraph 4 - page 4; claims 1,3-7,10,12,15; examples 1,2; table 1	9-12,15
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Information on patent family members

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